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ABSTRACT

This study examined similarities and differences among children who regularly use computers at home, including difference in their families and communities. The following characteristics were identified as key factors that might be associated with differences: gender, age, parental computing experiences, number of computers in the home, socio-economic and cultural factors, and school experiences. Differences were investigated in terms of children's perceptions of their access to and use of computers. Topics explored included children's ways of using the computer, ways of learning to use the computer, and who they perceive owns the computer. A total of 275 children in grades 3-6 from nine schools in Sydney (Australia) were interviewed. Results indicated that there are a number of children in today's classrooms who are confident, competent, and regular users of computers in their homes. These children use computers for a variety of purposes and are comfortable moving between playing games and doing work on the computer. While game playing remains the most common activity, many children regularly write, draw, and use information-based programs for leisure as well as school-related work. Generally, the children came from homes where other family members also use the computer for a variety of work-related and leisure activities. The interview schedule is appended. (MES)

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Children's Use of Electronic Technologies in the Home

(based on structured interviews with 275 children in eleven primary schools in urban Sydney)

February 1996

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1. Summary

The results of this part of the study clearly indicate that there are a number of children in today's primary classrooms who are confident, competent and regular users of computers in their homes. The purpose of this study was to describe the computer experiences these children have within their homes and to explore patterns of similarities and differences in terms of the child's age and gender, and the characteristics of the family and community from which the children come. It is not the purpose of this study to estimate what proportion of the primary school population belong to this group.

These children use computers for a variety of purposes and are comfortable moving between playing games and doing work on the computer. While game playing remains the more common activity, many of these children regularly write and draw and use information-based programs for leisure as well as school-related work. Boys and girls reported the same frequency of game playing on the computer, but boys were more likely to own and operate a dedicated video-game machine in the home as well as the computer. Girls were more likely to report that they wrote stories (narratives) for leisure on the computer, while younger boys and children without printers were more likely not to write stories.

Many of the children in the study have one or both parents using computers as part of their paid employment. There was a strong link between parental use of computers at work and the school/community to which the child belonged. Children who had one or more parents using computers in their work place tended to have more computers, printers, CD Rom drives and modems in their homes, however the uses the children made of the equipment varied little from those children whose parents did not use the computer in their work place.

Generally the children came from homes where other family members also use the computers for a variety work-related and leisure activities. In many families the fathers were the predominant individual "owner", the main teachers in the early stages of the children's learning about computers, the primary source of technical help when the computer needs 'fixing' and often the key decision maker about purchasing new software. In these families, the children still saw themselves and their siblings as the predominant users of the computers, along with their father. As well, other family members also played an active part as role models in using the computer, with mothers often helping with computer-based homework and supervision of

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2. Background

In 1995, Stage One of a study into *Children's Use of Electronic Technologies in the Home* was completed. In this stage researchers held discussions with 190 children from three schools in south western Sydney. These children ranged in age from five to twelve years of age. They were selected on the basis that their parents had reported them as regular users of computers in their homes. Regular users were defined as children who used a computer at least two or three times a week for games and or other purposes. In these discussions the children described the physical and social environments within which they used the computers. Topics ranged from who owned the computer's, where it was located, who used it most, how the children used it, what rules surrounded the use of the computer, how the children learnt to use the computer and the children's perceptions about the differences between home and school computing. The results have been published in a report[1].

3. Purpose

Stage Two of the study was designed to seek clarification of many of the issues raised in the first stage of the research. In particular, an attempt was made to see what similarities and differences existed across children who regularly used computers at home, and across their families and communities. The following characteristics were identified as key factors that might be associated with differences.

children	gender and age
families	parental computing experiences, number of computers in the home
communities	socio-economic and cultural factors, school experiences

The study was designed to investigate these differences in terms of children's perceptions of their access to and use of computers. Key topics explored include children's ways of using the computer, ways of learning to use the computer, who they perceive 'owns' the computer,

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[1] Downes, T. Reddacliff, C., and Moont, S. (1995) A Preliminary Report of Children's Use of Electronic Technologies in the Home. University of Western Sydney, Macarthur. (t.downes@uws.edu.au)

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Table 1

Numbers of children interviewed

Grades	3		4		5		6		Total
Gender	M	F	M	F	M	F	M	F	
Schools									
1	4	4	4	4	4	4	4	4	32
2	4	4	4	4	4	4	4	4	32
3	3	3	3	1	4	4	4	4	26
4	4	4	3	6	3	4	1	3	28
5	4	4	4	4	4	4	4	4	32
6	4	4	4	4	4	4	4	4	32
7	2	4	4	4	4	4	4	4	30
8	4	4	4	4	4	4	4	4	31
9	4	4	4	4	4	4	4	4	32
Total	33	35	34	35	35	36	32	35	275

The interviews lasted between twenty and thirty minutes. They were structured, using a set schedule. Appendix A contains a copy of the interview schedule. During the interviews researchers recorded responses on a form. All interviews were taped, to allow for checking the accuracy and completeness of the information recorded on the form. The interview schedules were based on issues that were identified in Stage One of the study. They were trialed in one of the schools engaged in the earlier stage.

5. Results

5.1 Communities

The communities of each of the nine schools varied in socio-economic and cultural backgrounds. Two school communities could be described as wealthy predominantly anglo communities (1,9), two school communities as middle class communities- one multicultural (2), the other predominantly anglo (6), three as multicultural middle class/working class communities (3, 4 and 5) and two multicultural communities in south western Sydney drawing a large proportion of their families from public housing estates (7,8).

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and timetabled classes over 69% of children reported that they used the computer at least once a week.

5.2 Family members

The age and gender of the children interviewed is presented in Table 1 above. 142 girls and 134 boys were interviewed. About 90% of the children came from two-parent families with about a third of the children being the oldest in their family. There were equal numbers of families with sisters and brothers. Almost half of the children came from families where the oldest child was still in primary school, a third where the oldest was of secondary school age and the remainder where the oldest was post-school age.

5.3 Family use of computers

The children were asked to comment on their family's use of the computer in their home. About 75% of the children reported that their father used the computer/s in the home, about 65% that their mothers used the computer/s and about 84% that their brothers and/or sisters used them. In general children saw other family members using the computers for a variety of tasks. In the case of parents, children reported that they bring work home or work from home, do family work or voluntary work for local organisations, and use the computer for leisure. While these patterns hold for both mothers and fathers, children reported that their fathers are more likely to do employment-related work on the computer and mothers more likely to do home-related work and work for voluntary organisations.

When reporting their siblings use of computers, the range of tasks covered school work, writing and games, with games being the predominant activities for brothers and the combination of school work and games for sisters.

There were differences related to community for numbers of children reporting parental use but not sibling use. The differences though marked were not fully consistent with the socio-economic / cultural differences in the school communities. For example fathers of children from schools 3, 4, 5 and 7 were less likely to use the home computer/s than their counterparts, and mothers of children from schools 1, 2 and 6 were more likely to use the home computer/s than their counterparts.

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The differences between mothers and fathers using a computer at work are not as great as they seem. When children who have both parents using computers at work are taken into account, 34% of the children report that they have mothers who use a computer at work and 44% have fathers that do.

Large differences do exist, however, across school communities in terms of the percentages of children who report that one or both parents use a computer at work. These percentages vary from about 20% at School 3, through to about 90% at schools 2 and 9. In this instance there does appear to be a consistency with socio-economic and cultural backgrounds of the school communities with the wealthier school communities (1, 2, 6 and 9) having higher proportions of one or both parents using computers at work and the less wealthy school communities (3, 4, 5, 7 and 8) having relatively fewer parents using computers at work.

5.5 Computing equipment in the home

Two hundred and sixty six children had computers in their homes. Nine children without computers in their home had regular (several-times a week) access to computers in the homes of members of their extended families or neighbours. Of the children who had computers in their homes, about 30 % had two or more working (not broken) computers, about 80% had a printer, about 50% a CD Rom drive and 20% a modem. In general the children used all of this equipment, except in the case of the modem, where less than half of the children who had a modem in their home, actually used it. Invariably these were boys.

While there were no age and gender differences in the children's perceptions of what equipment they had in their homes, there were differences between children who had one or more parent using a computer at work and children who had neither parent using a computer at work. Children who had one or more parent using a computer in their work were twice as likely to have two or more computers in their home, and more than twice as likely to have printers and CD Rom drives. Furthermore, these children's families owned all but 8 of the 52 modems! As noted above, parental use of computers at work is also linked to socio-economic and cultural backgrounds. Within the scope of this study it is not possible to further clarify the relationship between the amount of equipment in the home, parental use of computers at work and the socio-economic and cultural backgrounds of the families. Therefore in the following analyses the age and gender of the child and parental use at work

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(particularly fathers) were involved in the decision making process, children from families where one or both parents used computers at work were more likely to regularly buy new software for the home.

5.7 Children's talk about computers and computing

When children were asked to describe the computer equipment in their home, there was a wide variety of responses. This is consistent with Stage One of the study. In particular the age differences in approaches to describing the computer was still evident although in Stage Two, the children's ages only ranged from eight to twelve years old. As expected younger children gave shorter and simpler answers and older children more elaborate ones involving more technical terms. Younger children were also more likely to describe the computer in terms of its looks and the software on it, while older children described the capabilities of the machine and the purposes for which it is used. Girls were less likely to describe the computer in terms of its technical capabilities. There were no family- or community-related differences in the descriptions. Some examples of comments from these children are:

"my computer at home is big and heavy and a bit grey" (Year 3 boy);

" its a (Brand), its very easy to use, its has lots of things that came with it, it runs most games, and has a lot of megabytes" (Year 4 girl);

"(brand), 486, 33 Mhz, 16 bit sound card and superVGA colour monitor" (Year 6 boy); and

"an old (brand) model, no Windows, but has DOS, its useful. It has Word Perfect, drawing program, new Print Shop and games" (Year 6 girl).

In all 29 children described the capacity of their computer using a string of technical terms. 20 of these children were boys, 17 of which were in Years 5 & 6. Many children were comfortable with a range of technical terms. These included: *icon, options, applications, accessories, megabytes, soundblaster, hard drive, disk drive, joystick, memory, RAM, files, file manager, control panels, finder, password, modem, Internet, graphics, arrow keys, and disks.*

The more common vocabulary that was used included *mouse, keyboard, CD Rom, click on it, enter, play, windows, DOS, load, wait, programs, games, buttons, power switch button, menu, monitor, and compatible.* The importance to the children of having a mouse became evident during the descriptions with over two-thirds of the children mentioning that their

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The children reported that they spoke about the kind of computer and software they had, new games and programs, what they had recently done on the computer, when their computer wasn't working, when they were able to use it, and about stories they were writing on the computer.

5.8 Ways of using the computer

During the interview children were asked questions about what they used the computer for. In particular they were asked questions about writing, drawing, doing projects and other homework. Each of these topics is discussed in turn below.

5.8.1 Writing

Over 90% of the children used the computer for writing. Those that didn't were more likely to be boys in the younger grades or children without printers. About 66% of the children write on the computer both for school-related tasks as well as recreational or non-school tasks. Many of the children reported that they used the computer to write for a variety of purposes and audiences. These included stories, letters, party invitations, signs, poems, songs, cards, jokes, memos/messages, lists, captions, diaries/ journals and recipes. A small number of children reported that they copied texts from books. Only one child mentioned the word Internet within the context of writing letters to friends although in another part of the interview two children spoke of 'talking' to friends using the modem (which requires writing). The only systematic difference found was related to gender and writing stories, with girls being the predominant story writers.

Some children write straight on the computer and others write on paper first and some children do both, depending on the task. There appears to be a school / home difference in the minds of some of the children.

"Depends if it's for fun I write straight on the computer. If it's for school then I want it to be perfect, so I write on paper first. (Year 4 girl).

Some children prefer the computer because of the ease of editing.

"it's not much use doing a draft because you can delete it if you do a mistake" (Year 6 boy); "straight on the computer, it's much more fun, you can rub it out again" (Year 4 girl); and "ideas come quicker on the computer" (Year 5 girl).

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they use the computer for homework, with 86% of Year 6 children saying that they do some kind of homework on the computer.

For the majority of students doing projects still involved moving between the screen and paper. Some children used screen and paper-based sources of information, others printed out the information from the screen, worked on it on paper, then typed the final version back into the computer. A small number of children worked within the screen environment until the final stages then wrote the final copy by hand. Most of these children did not have access to printers in their home. Some illustrative comments were:

"print the information off Encarta. Underline the bits which are important and type them up" (Year 4 girl);

"...used Groliers to get the information, and used encyclopedia (books) for information. Printed the information from Groliers and changed it into my own words. Typed it back again. Printed pictures and did a title page."(Year 5 boy);

"project on gold. Click on encyclopaedia. Choose topic. Print information out. Do draft. Start to type it back in. Change font for headings and writing. Use underline and borders" (Year 6 girl); and

"on Humpback whales - went into Encarta and typed in whales and it took you to all the whales. Looked up humpback whales gave me all the info, printed it and wrote it out by hand." (Year 3 boy).

When obtaining information from CD Rom encyclopaedias, many students were able to use their reading, summarising and editing skills. Many read through the information and selected information to put into their own words and re-typed it back into the computer. Some students were able to do this within a fully screen-based process:

"go to the encyclopaedia, cut information from the encyclopaedia and paste it into (word processor). I change, add, delete and try to put it in my own words" (Year 6 boy).

Some children showed a lack of understanding of copyright and plagiarism as they literally pasted the print straight into their book or project or directly copied paper-based text into the computer. Two such children explained how they:

"printed out the information. Read it. Cut it up with scissors because some of the information is too hard to understand. Pasted it onto cardboard" (Year 4 boy); and

"went to the library - got book and photocopied it and just typed in up on the computer (Year 3 girl).

Another interesting feature of the children's comments about their school- related home computing was the number of children who mentioned the help they received with their work.

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frequencies are from girls in these schools where more that 30% of them report playing at least once a day compared to their counterparts where 18% or less report doing so.

5.9 Ways of learning to use the computer

The first things that children say they learn to do on the computer are to turn it on and off, to save files, play games, use word processing or typing, use Windows, move the mouse and click on things, operate the keyboard, and use the disks. Children's comments included

"double click the mouse to get into things" (Year 5 girl)

"how to get into games and then click on a thing and it had another thing I could do like writing and drawing and I went on from there" (Year 5 boy)

"then dad taught me how to use the directories" (Year 6 boy)

According to most children (75%) they learn to use the computer by having another person show or teach them what to do. The tutor is usually a family member. Fathers were named as the tutor twice as often as mothers, and brothers were named as the tutor twice as often as sisters. An additional 12% of students said that they learned by watching someone else use the computer, which is an indirect and more passive way of learning. The remainder of learners were taught by school teachers and extended family members such as uncles, aunts and cousins. Only 10% said that they taught themselves or read the computer manual.

Following the initial teaching period the learning is gradually handed over to the child. When children get encounter difficulties with something on the computer they were asked whose assistance they sought and why the person named is their helper. Most children selected a family member on the basis of their knowledge of computers:

"my sister- because she knows more about computers than dad" (Year 4 girl)

"my brother- he is the smartest one on computers" (Year 5 boy)

"dad's friend is the most computer literate person I know" (Year 6 boy)

If something goes wrong with the computer when it is being used, children were asked if they thought they could fix it themselves. 41% of the children said "no", 28% said "sometimes, depends or mostly" and 28% said "yes". Older children were slightly more likely to have a positive response. However, children who had one or more parents using a computer at their work were almost twice as likely to have a positive response to the question. Interestingly gender had no relationship with the children's responses yet fathers were, overwhelmingly the

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permission is needed, and codes of behaviour when using the computer. Many children reported that they need to complete homework (on or off the computer) before they can play games and they have overall limits on the amount of time they can play games. Their comments about personal rules included

"no rude pictures; no rude words on the program where you type something and it talks" (Year 5 girl);

"If I have homework I have to finish it and then I can play games on it" (Year 5 boy);

"only once a week, if a play it too much mum will take out the mouse and hide it." (Year 6 boy);

"not allowed to use the Internet unsupervised. No shooting games." (Year 4 girl);

"one hour a night for school nights, anytime on weekends, take a rest after two hours on weekends and must ask to use the modem." (Year 6 boy); and

"If I've been in trouble at school then I'm not allowed to use it for a couple of weeks." (Year 5 boy).

The third set of rules involve care and use of the computer.

"Don't eat near it: wash hands; don't touch the screen, be careful with it, don't play around with the mouse." (Year 4 girl);

"don't hit the keyboard hard, don't be rough with the mouse." (Year 4 boy);

"don't turn it off automatically because you wreck it, close Windows 95" (Year 3 girl);

Within this category there are also rules about use of printers. Many of the younger children reported that they cannot use the printer without supervision / permission. Some children also reported that there were limitations on how much they can print or how much colour they can use. One child reported similar limitations on Internet use. Typical comments were:

"can't print too much" (Year 3 girl);

"don't use too much colour on the printer" (Year 4 girl); and

"on the Internet, only allowed 30 minutes to 1 hour. When time runs out you have to turn it off. For other things, can use as long as I want." (Year 6 boy).

In all 23 children reported that there were no rules in their homes. However, half of these qualified their statements. Many of these statements indicated the presence of implicit rules. An example of such a comment is:

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skills. Others generalised to learning about new technology - how to understand it more, learning that computers are a useful thing. A number of children mentioned the future, or skills for when they're older. Many children mentioned "how to get information" and gave examples of the topics /areas that they had learned about. These included countries, wars, animals, machines and famous people. More often than not these comments included references to CD Rom-based encyclopedia or factual texts. As well, a large number of children referred to school subjects such as maths, reading, writing, spelling, sentence construction, history, geography, science or the general description "how to do school work". 74% of children said that owning a home computer gave them an advantage at school:

" computers help us to learn a lot more to work together, to find out information, and they are lots of fun. If you think computers are boring, they are not. You are always learning new things. (Year 6 girl).

5.12 Differences in home and school use.

70% of the children preferred to use a computer in the home environment rather than the school environment. 14% of the children enjoyed using a computer in either environment and did not want to select a preference:

"It doesn't matter where you use a computer" (Year 6 girl); and

"There are lots of different games to choose from at home and at school" (Year 3 girl).

The type of computer hardware and software available in the home and school environments was the main reason given by children for their preference. Frustration was caused by the limitations of some computing equipment:

"My computer stops in the middle of a game. School has a better computer, it works properly" (Year 4 girl); ":

"At home our computer is old, it's just about had it" (Year 5 boy);

"School has things that I don't have at home, like a CD Rom" (Year 4 girl);

"At school the printer sometimes doesn't work, so it's unreliable" (Year 6 boy); and

"The school computer is easier to use because it goes straight to Windows" (Year 6 boy).

Some families had more sophisticated computing equipment than their local schools:

"My computer at home has better things on it, more information, more programs and it's more modern" (Year 4 boy);

"At home my computer is better and faster with more memory and programs. I have 500 megs of memory at home. The school computers only have 40 megs." (Year 4 boy);

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behaviour on or near the computer, taking care of the equipment and the number of students using the computer.

"if the teacher's not there you are not allowed to use the computer" (Year 5 boy);

"be quiet" (Year 4 boy);

"can't mix up or delete anything" (Year 5 boy);

"no getting into the control panels (Year 4 girl);

"never bang on the keyboard, don't break the computer" (Year 3 girl); and

"only two people can use one computer" (Year 6 girl).

Frequency of computing varied in the home and school environments. 73% of the children in this survey used their home computer two or more times each week. Only 20% of children said that they used a school computer two or more times each week. The length of time the children used the computer at home was generally more than the time they were allowed at school. Equally important to the children was the fact that they had more control over the amount of time that they spent using the computer at home.

70% of children said that they used their home computer by themselves. At two schools, computer use was structured in ways to allow students to have a computer to themselves, at four schools computers were shared by small groups of students and at three schools computers were sometimes used by single students and small groups.

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Thank you for coming to help us. I am _____ from the University of Western Sydney. We are here to ask some questions about how computers are used at home. There aren't any right or wrong answers. I have some questions that will take about 20 minutes. I am taping your answers so we don't miss any important information. Is this O.K. with you?

Admin Details
Name ID Date
Sex Class Time
School

How many brothers and sisters do you have? Who is the eldest? How old? Next? Age? etc	m/f	m/f	m/f	m/f	m/f
No of adults / parents at home? (if split families- prompt for both homes) (check for other adults in house)	mum	dad	other		
Do your parents use a computer at work (place of work) ?	mum yes/no	dad yes/no	other yes/no		

Home

How many computers do you have at your house? Working? Being used?	yes/no/dont know yes/no	yes/no/dont know yes/no	yes/no/dont know yes/no
Can you tell us a little about your computer /s? Type? Appearance? (check none are games machines or toy computer etc, check for a mouse) Do you use this computer?	desk/lap	desk/lap	desk/lap
How do you work the computer?			
Who owns the computer/s at your house? (self, dad, mum, family, brothers, sisters, other, shared, loaned)			
Where do you keep the computer/s at your house? (shared: loung,dining, hall, kitchen, family,) (whose study? whose bedroom)			

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How long ago was that?	So long, cant remember	I years	year	a year		
if first at school ask about home How long have you been using a computer at home?	So long, cant remember	Severa l years	about a year	less than a year	a few months	a fe week
How often do you use the computer at home?	Several hours a day	At least once a day	Two or three times a week	About once a week	Less than once a week	hardly ever
Have you watched less TV since you got the computer?	yes/no					
Do you talk about computers with your friends or family?	yes/no / depends/ dont know					
Do you mostly use the computer alone or with other people?	alone/with others					
When you do use it with someone else who?	who?					
At home ...When you first started using the computer how did you learn? who helped you? who helps you now? why is that person the helper?	can't remember - so long ago / dont know taught / watched / fiddled-used/read/ don't know dad, mum, brothers, sisters, others dad, mum, brothers, sisters, others					
When something goes wrong with the computer can you usually fix it yourself?	yes	mostly	sometimes	depends	no	
What rules are there at your house about using computers? What happens if every one wants to use the computer at once? Are there any special rules about who gets to use it or what types of use get first priority?						

Uses-Games					
How often do you play games on the computer? (not the games machine)	Several hours a day	At least once a day	Two or three times a week	About once a week	Less than once a week
Which is your favourite game? (on computer or games machine) Why?					
How do you learn to play a new game?	play it, read, watch ...who?, taught ...by whom?				
How do you get better at it?	practice, read, share, ask				
What do you learn from playing games?					

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else with the school computers?							
How often do you use the computers at school?	Several hours a day	At least once a day	Two or three times a week	About once a week	Less than once a week	only three or four times a term	hardly ever / never
How long is each time at the computer?							
How do you get to use them / have a turn? -rosters? groups?							
How did you learn to use the computers at school?							
When you need help who do you mostly ask?	teacher m/f monitor friend group member classmate m/f?						
What happens if something goes wrong with the school computer?							
What rules are there at school about using computers?							
Do you use the computers at home and school for different things? what things?	yes/no						
Do you ever use the computers at school to do projects ?	yes/no/ depends						
What other differences are there between using the computers at home and at school							
Do you prefer to use the computer at home or the computers at school? Why?	home/school						
What do you learn from using the computers at school? (if "nothing" ask why do we have computers at school?)							
Is there anything else you would like to say about using computers at home or at school?							

Is there anything else you would like to ask about what we have been doing here?

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